Professional Development Networks: Building a Case for Learning Analytics in the Workplace

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Abstract

This paper aims to contribute to the understanding of informal workplace learning and the importance of social networks that enable this. Informal learning has become an important driver for professional development and workplace learning. However powerful informal learning may be, there is a problem when it comes to making it a real asset within organizations: Informal learning activities are spontaneous and mostly invisible to others. The aim of this study is to develop a method that helps raising the awareness about these activities using a Learning Analytics approach. This method concentrates on detecting and visualizing informal professional networks and tries to find ways in which their presence and accessibility can be improved. This study shows that the presented methodology is a promising research driven intervention. With this methodology we can detect multiple (isolated) networks in organizations, connect their ideas and facilitate their value creation. Using this approach, organizations can link in with existing informal networks of practice and unlock their potential for organizational learning by giving them a voice and make their results more explicit within the organization.

Keywords
Learning analytics, networked learning, professional development, workplace learning, organizational learning, human resource management

Introduction

Organizations, when thinking of teacher professional development, often rely on refreshment courses given by experts, in-service training, or personalized learning trajectories such as coaching. These formal training opportunities provided for professionals represent just the tip of the iceberg when imagining all learning that takes place, triggered by the challenges professionals face in their daily practice. The more spontaneous and informal ways of learning are however largely overlooked in organizations and the effects of it remain therefore implicit. Yet at the same time there is a large body of literature that convincingly shows that these forms of spontaneous work related learning are important drivers for ongoing professional development (Eraut, 2000, Marsick, 2001; Nonaka and Takeuchi, 1995; Billett, 2001). Research shows that workplace learning does not occur in isolation. Workplace learning is deeply connected with the work that people carry out and is mostly done in collaboration with colleagues and peers. Professional development is effectively realized and organized by professionals through their own social networks and communities (Wenger, 1998; Cross & Parker, 2004; Duguid, 2005; Hargreaves & Fullan, 2012; Weinberger, 2012). Learning, working and innovation is therefore closely linked (Billet, 2001; Marsick, 2001) and understanding work practices seems
critical in analyzing how learning takes place and how knowledge is shared and created through a web of social relations maintained throughout one’s working life (Wenger, Trayner & De Laat, 2011).

However powerful this informal learning may be, there is a difficulty when it comes to utilizing it: Informal learning activities are mostly ad hoc, spontaneous and invisible to others (Cross & Parker, 2004). As a consequence informal learning in organizations goes undetected and is therefore hard to assess, manage and value (Wenger, Trayner & De Laat, 2011).

This problem poses an interesting challenge for the field of Learning Analytics (LA), namely finding ways to capture and analyze traces of (social) informal learning in every day life and work networks. We believe that LA has the potential to make a great contribution in the area of professional development and lifelong learning and that its ideas can be applied to human resource management, knowledge management and organizational learning. Especially because LA aligns well with two principles, we think are crucial for enabling professional development in organizations; 1) LA can help to shed light on (unplanned) ongoing learning and professional development activities that are directly connected with the actual work practices, and 2) it can enable a bottom-up culture of learning in organizations driven by the real and urgent needs of professionals, rather than a management driven approach that seems to be dominated by (individual) courses controlled by the corporate curriculum agenda, relying on outside experts and transfer of knowledge (Boud & Hager, 2012).

In this paper we will first outline our theoretical approach to professional development and the importance of social networks. Secondly we will present our empirical research and discuss how our findings inspired the development of LA tools to foster large-scale networked professional development in organizations.

Theory

Commitment to professional development means commitment to organic growth, anticipating the changing nature of work practices. Professional development is not a matter of knowledge acquisition being transferred from one context to the other. In this approach we follow the argument of Boud and Hager (2012), where they build a strong case for rethinking continuing professional development through changing its metaphor (from acquisition and transfer towards metaphors that include participation, constructing and becoming) and locating learning in professional practices in day-to-day work. In their view, “learning is a normal part of working, and indeed most other social activities. It occurs through practice in work settings from addressing the challenges and problems that arise. Most learning takes place not through formalized activities, but through the exigencies of practice with peers and others, drawing on expertise that is accessed in response to need. Problem-solving in which participants tackle challenges which progressively extend their existing capabilities and learn with and from each other appears to be common and frequent form of naturalistic development.” (p.22).

Enabling this perspective of learning means being in touch with the professionals around you, building the networked connections you need to participate in constructive professional dialogues about what it means to become a professional; able to perform within in the workplace. Professionals especially in demanding jobs are often faced with complex issues and Lohman (2006) found that professionals rely to a great extend on interactive learning activities to solve work related problems.
While observable explicit knowledge is easy to obtain through reading or training courses, informal social learning in the workplace allows to develop the deeper, softer, tacit components of knowledge (Lane & Lubatkin, 1998). Professionals may be informed about new approaches individually during training workshops, it is through their informal social networks with colleagues they learn how to interpret, embrace, share, compile, contextualize and sustain this new knowledge (Baker-Doyle & Yoon, 2010). For that reason it becomes important to have an extended and trustworthy network of professionals to rely on (Levin & Cross, 2004). Other researchers have also reported that learning in networks is beneficial for professionals (Goodyear, Banks, Hodgson, & McConnell, 2004; Harasim, Hiltz, Teles, & Turoff, 1995; Lieberman & Wood, 2002) and a productive approach for professional development (Baker-Doyle & Yoon, 2010; Dresner & Worley, 2006).

Networked Learning is an emerging perspective that aims to understand learning processes by asking how people develop and maintain a ‘web’ of social relations applied for their learning and professional development (Goodyear, Banks, Hodgson & McConnell, 2004; Haythornthwaite & De Laat, 2011; Steeples & Jones, 2002). Networked Learning focuses on the diversity of social relationships people develop, what strategies they use to maintain them and the value this creates for learning. Both weak relationships, held with acquaintances, and strong connections like long-lasting friendships with peers and community memberships, are important for professional development. Granovetter (1973) demonstrated that weak ties are important for gaining access to new knowledge. Whereas strong ties, with those who are close to you, are needed to deepen and embed knowledge closely related to day-to-day shared practice, as well as commitment to joint activities.

In communities people develop tight, long-lasting social relationships related to their practice and domain. However, emergence and cultivation of communities is a difficult process, and even apparently successful ones may fail (Bruckman & Jensen, 2002). Successful communities may also turn their attention inward, preserving and deepening group knowledge, but failing to capture new information. A strong core may also dissuade participation by those outside the central core, or fail to provide an environment where newcomers can come to understand norms and practices through legitimate peripheral participation. Communities of practice are often formed to place an emphasis on strong relationships engendering a certain closeness and unity of purpose (Jones, Ferreday & Hodgson, 2008). A networked perspective encompasses more and different relations, looking at the diversity of social relationships people maintain and the diversity of ties (weak to strong) that make up communities and other forms of social networked structures. Therefore networked learning looks at the relative number of contacts one has and the intention in which they are being used, taking into account the multiplexity of relations being used for learning. This can mean talking with one or more colleagues in the hallway or in the coffee corner; sending an email, Skype or phone with a few peers around the world; or sharing your experience with one or more (online) communities.

Where networked learning helps to understand the importance of ‘learning ties’ for professional development. The Learning Analytics domain is aimed at developing tools to raise awareness about the presence of learning activities and processes. LA is about harvesting and analyzing information about learners, with a main focus on learners’ behavior in virtual environments in the frame of formal learning activities, like completing assignments and taking exams and in more informal settings like posts on discussion forums and online social interactions (Siemens, 2010;
Buckingham Shum & Ferguson, 2011). At the moment much of the LA literature is concerned with learning in educational settings based on online interactions in Virtual Learning Environments (See, proceedings of LAK 2012 - Dawson & Haythornthwaite, 20120). In this paper we hope to extend this focus by proposing a LA based for analyzing traces of learning in the area of professional development and lifelong learning. The research question addressed in this paper is twofold. First, can we develop an approach to professional development that is connected with the day-to-day informal networked learning activities in the workplace? Second, how can these insights provide directions for developing scale-free automated LA tools, that facilitates these informal networks to utilize their learning potential?

**Empirical Base Study**

In our research program we look into informal learning networks in the workplace and how this influences professional development. We are working with research projects in the educational sector, focusing on teacher professional development. When interviewing school leaders it seems that most of them have no or limited sight on what teachers learn in their day-to-day practice, let alone how to stimulate or reward this. Some even hold the opinion that teachers are not knowledge workers or professionals at all. We contest this perspective, but due to a lack of sufficient empirical evidence it is hard to tackle this view. In our approach to develop a learning analytics framework to facilitate informal professional development networks, we were inspired by the work of Homan (2006). He found that successful organizational change and innovation is dependent of the support and actions of what he calls the informal organization. This refers to the informal powerbases maintained by informal networks within the organization. Homan developed a social network analysis (SNA) based research methodology – called change mirror - to detect informal networks and ‘show’ to the organization the impact of their voices and opinions, using a group discussion software. This methodology will be tested in the context of networked learning in organizations to see how this fits with our aim to detect informal professional development networks, study what they are about and use this to influence the design of LA tools.

**Method**

**Procedure**

We combined Homan’s change mirror approach with a multi-method research design for studying networked learning (De Laat, 2006). The aim of this is to paint a more complete picture of networked learning processes in a naturalistic setting (Erlandson, 1993). This multi-method research framework triangulates social network analysis (SNA) to find out ‘who is talking to whom’, content analysis (CA) to find out ‘what they are talking about’, and contextual analysis (CxA) focusing on the context of the organization the participants are working in to find out ‘why they are talking as they do’.
Together with Homan’s change mirror this resulted in the three step research design:

*Step 1 SNA*: Network analysis, aimed at finding out who is talking to whom with respect to a particular problem. This step visualizes existing informal networks where professionals collaborate on a certain problem and shows the extent to which they are (or are not) connected throughout the entire organization. This is done using an online survey.

*Step 2 CA*: The next step is aimed at finding out what these networks are talking about, what are their ideas and thoughts on this problem. This is done with a group discussion tool called Synthetron. All participants will take part in a synchronous online discussion, where they can share and talk about their ideas and experiences with this work-related problem. The tool makes the entire discussion as well as logged data available for analysis.

*Step 3 CxA*: This research methodology stresses the importance of working with a design team. The purpose of this design team is to form a representative ‘micro cosmos’ of the entire organization. This way the collected data can be interpreted and understood in its own naturalistic setting. An external researcher alone will not be able to interpret the impact particular networks may have on the organization let alone put a weight on the ‘voices’ that resides in these networks. The researcher relies on this design team for understanding what is said in which networks and it is within this design team that further actions and plans for follow up interventions are planned.

**Participants**

A large school district of 70 schools in the Netherlands, cooperating together under the umbrella of a joint academy for professional development, participated in this study. The academy is a fusion of four different groups of schools each of a particular denomination. The problem they are all concerned with is the implementation of societal internships for their students in their curriculum. This is a totally new task for the schools, meaning they have to develop a vision of what these societal internships are, develop relationships with organizations in the region where the students can go for their internships, and develop meaningful tasks and procedures to streamline these activities. Since there is no history on this innovation the teachers are faced with developing new knowledge themselves. Within each school there is at least one teacher who is working on this issue.

**Findings**
**Step 1: Detecting networks**
The survey (returned by 52 participants) produced a network visualization of teachers talking with each other about societal internships. Figure 2 clearly shows the existence of several (isolated) networks talking about this innovation. The colors represent the four different school denominations. The pink color refers to external people who are involved in the networks but not working at one of the schools in question. It is clear from the links between the networks that the people are more or less connected to members of their own denomination. Little or no connections between the different colors are found. A second observation is that within the color groups there are also multiple networks with view connections between them. Further analysis by the design team learned that these small networks refer to specific school locations in which several people talk together about the innovation. From this we can conclude that the teachers mostly discuss this problem with colleagues in their own schools and only limited with colleagues from within their own denomination. Some participants within the small networks seem to take a central position and/or act as bridges (connecting networks). Further analysis showed that in most cases these participants are school directors or otherwise teachers within the school who have a more flexible work agenda. This way they are not limited to teaching hours and can move more freely between schools for meetings.

![Figure 2. Communication networks found in the joint academy (based on empirical data)](image)

**Step 2: Synthetron group discussion**
Fifty teachers logged on to the synchronous Synthetron group discussion to talk about what matters to them with respect to the problem at hand. The main aim of this discussion was to find out where they are at with implementing this in their own schools, to what extent they would like to collaborate between schools within their joint academy, and what they would like these collaborations to be about. What do they need to learn most ‘urgently’ from each other and what materials can be shared amongst them to avoid reinventing the wheel several times within the organization, is the central focus of the Synthetron discussion.

Based on text analysis and the log files, the discussion proved to be very useful for gaining insight into the practice and needs of individual teachers concerned with this problem (they explored issues like managerial support, time pressure, quality and experience). Never before has there been a collaborative conversation amongst the teachers at this scale about this issue and being able to have a voice on this matter is valued by the participants. Recognizing shared concerns is of great value as well as
identifying materials produced in order to make this innovation work. Especially because there seems to be quite some overlap in the individual experiences. When the question was asked whether they would like to start working together aimed at producing and sharing resources, there was a high number of consensus amongst the teachers. They explored concrete ideas (stories, good practices, procedures, standard forms, policy documents, excursions, etc.) that they would like to share or develop further. The main reason for working together according to them is to learn from each other and to avoid reinventing the wheel and saving time and effort.

**Triangulation: combining step 1 & step 2 of the network mirror**

When combining the results of the online survey and the Synthetron discussion with the design team, we can build a clear picture of potential energy for networks to start working together or share information and resources. In figure 3 (see below) we have enlarged the nodes in the ‘isolated’ networks of the figure 2 who agreed to collaborate on topics mentioned during the Synthetron discussion. These people—referred to as key persons—agreed to the statements made during this discussion that it is important to share materials produced in order to help colleagues dealing with the same innovation in other schools that are part of their joint academy. When observing figure 3 it is particularly interesting to see that these key persons in the networks, seem to be relatively well spread across the isolated networks as well as across the different denominations that are part of this joint academy.

![Figure 3. Key persons across networks found in the joint academy (based on empirical data)](image)

This means that after detecting the informal networks (step 1), there is potential interest in connecting these networks (or at least participants of these networks). The key figures in these networks could be seen as latent ties (Haythornthwaite, 2002) bridging the gap between currently unconnected networks within the organization. Being able to build connections amongst these spontaneous informal learning networks will boost the exchange of knowledge and productive learning within the entire organization.

While the design team sees the potential of this approach, they also indicated throughout the meetings that this is time consuming as well as that their work is often misunderstood by local management and meets some resistance within the formal organization. As a consequence they don’t see it as their role to facilitate these changes within the organization.
Implications for LA design

This study shows that the approach is a useful research driven intervention method to shed a light on informal networked learning in large organizations. With this methodology we can detect multiple (isolated) networks in the organization and connect ideas and foster collaboration beyond existing boundaries. It allows organizations to link in with existing informal professional development networks and unlock their potential for organizational learning by giving them a voice and make their results more explicit within the organization. This way we can overcome some of the traditional weaknesses of informal learning expressed in the problem statement described in the introduction. Informal networked learning tends to deal with tacit knowledge, is embedded in day-to-day practice and are spontaneous learning activities that are off the radar of HR departments and management staff. Valuable informal networked learning outcomes remain therefore often located in the relative small networks or communities in which it is produced without getting the recognition it might deserve or having a stronger impact on organizational learning and development.

Our problem definition stated that many professionals are learning informally and that this is facilitated by networked relationships. The research above shows that this is true, but it also shows that this approach is research driven, time consuming and costly (because of the involvement of a design team). This makes it difficult to realize its potential for LA when it comes to providing real time automated insights on large scale systems in which multiple professional development networks are operating on a variety of work related problems. The idea behind LA is to produce information about learning activities to the user, much in the same way the dashboard of your car provides you with information about the current state of the car. Applying this metaphor to our project and the findings it produced we found it necessary to improve our approach. The major limitations to overcome are:

- Improve data collection to detect informal networks. Online SNA surveys collect data only once and draws on participant’s ability to recall all the networked relationships that were involved.
- Allow the data collection to represent multiple problems. The visualization of one particular problem has limited scope and reduces its application for organizations.
- Provide instant feedback to the users. The current approach above takes time to analyze. Using automated LA tools, that are web-based, real-time and rely on user generated data can provide network visualizations automatically.
- Allow the visualizations to become dynamic and up-to-date. Through LA the dynamic development of these networks can be shown, keeping professionals in touch with those that are currently involved in collaborating on real / urgent problems in the workplace.

Based on these suggestions we developed the Network Awareness tool (De Laat & Schreurs, 2011) as way to improve and extend the LA approach introduced in our base study. NAT is an online tool that generates social network visualizations based on learning activities that professionals are engaged in. These activities are centralized on real / urgent problems in the workplace that require learning relationships with colleagues or experts they know. The tool combines three important streams of information: 1) it produces an overview of current issues or problems that professionals are actively working on informally, 2) For each of these issues, a network visualization is generated based on existing professional...
relationships, and 3) it shows in which organizations or subdivisions with an organization these network members are located. In sum this tool acts as a social learning browser\(^1\) where people can find learning ‘ties’ or develop learning partnerships in networks based on issues that truly matter.

In short, NAT works as follows. Users can register and create a profile page, with a focus on their work and area of expertise. Then users can list, describe and tag problems that are object of their learning activities. Then users can add persons they collaborate with on each problem. Users can also explore existing informal networked learning issues within their organization and link themselves to an issue they are active on within their organization.

![Network Awareness Tool](image)

Figure 4. Impression of the NAT profile page

Based on the information brought together in this tool, LA helps users to develop an overview of informal professional development networks in the entire organization, centralized on urgent or real problems. Figure 4 shows that users can navigate a tag cloud of all existing problem (in the grey column on the right). Having selected a problem of their interest they can see the informal learning network around that problem pictured in the middle section of the screen. This allows the user to explore the network from a user perspective, a specific organization perspective and all organizations involved. In the example in figure 5 presented below, a visualization of a network based on the ‘JB-RT’ problem (indicated by the red box in the tag cloud) in the ‘Ber’ organization is represented.

\(^1\) See XXXX for a demo.
Figure 5. Screenshot of the Instant Visualization accessible for the users

Also users can also click on the nodes in the network visualization to see its ego perspective – showing all the networks this particular person is involved in (indication of the areas of expertise of that person and how well connected this person is within and between participating organizations). The lower left side of the screen (see figure 5) also provides a list of the connections and themes that this person is an active networked learner in.

The graphical representations can be intuitively explored making it easy to switch between ego and whole network perspectives and to shed light on the information flow between informal learning networks within the organization and the expertise that the organization taps into related to particular learning topics. As such this tool becomes a social learning browser allowing professionals to find peers the can connect with based on problems they have in common through the course of their daily work.

Reflection and Future Studies

Based on the research described above we have developed an LA tool that improves step 1 (SNA), 2 (CA) and 3 (CxA) of our method for detecting and visualizing informal networked learning. LA enables us to combine and bring together an overview of problems that professionals are learning on in various social networks. Based on the descriptions that people provide on what these problems are about (CA) the tool provides insight in the learning needs and the value it creates. SNA helps to connect with professionals and form learning partnerships on issues that currently matter. But especially the third step (CxA) is of great importance, because as other researchers argue there is a need for changing the metaphors used when thinking about professional development (Boud & Hager, 2012) and a greater awareness of informal networked activity in connection with learning and development provides organizations the insight of how professionals learn together spontaneously based on problems that arise in the work (Lohman, 2006; Hargreaves & Fullan, 2012). This insight will help managers to integrate informal learning in the organizational’s professional development culture (Cross & Parker, 2004; Weinberger, 2012) and promote and utilize the value created within these professional networks and communities. This does not mean that informal learning should become formalized. Instead of choosing between informal and formal learning we should find a way in the middle, called informal-formal learning where informal learning gets formally
recognized within the organization and where formal training initiatives can be connected with the needs rising from daily practice (De Laat, 2012).

The tool we presented is based on information provided by professionals manually, but currently we are testing out ways in which the tool can be used as a plug-in for virtual learning environments. Together with the Open University of the UK we explore how NAT can be integrated in their Sociallearn environment (Ferguson & Buckingham Shum, 2012) and present the visualizations automatically based on online behavior of the users. We believe that if we apply this methodology to the virtual world, we can collect even more data, including data form communication via email, online discussion, blogs commentaries, or twitter streams, as well as hyperlink analyses of connectivity across sites (for a review, see Gruzd & Haythornthwaite, 2011). Semantic analysis can be conducted for creating tag clouds dealing with the descriptions of the networks (thus improving our CA analysis). Social networks analysis can be applied to datasets providing information about who interacts with whom, who downloads resources, etc. If we use this set-up, a more holistic story can be created about the online informal learning activities of people and organizations. It is tools like these we believe that can extend the discussion on the application of Learning Analytics and this paper is an attempt to stimulate a discussion amongst researchers coming from Technology Enhanced Learning, Networked Learning, Data Mining, Artificial Intelligence and Learning Analytics about technological solutions and methodologies to gather and analyse relational data on learning to create a holistic view of peoples off- and online informal life long learning activities in education, work and society.

Concluding Remarks

In this article we have described professional development is an on going process of acting, reflecting, and changing day-to-day practices. This perspective gives rise to a more bottom-up – self governing - understanding of learning where workers with their colleagues interact about their work experiences through sharing their experiences, knowledge and contacts providing access to new or alternative resources. Our study suggests the existence of professional development networks on a given problem, but also shows the limited extent in which these networks are connected amongst themselves.

Innovative professional development policies should involve opportunities for professionals to share their expertise, learn from peers, and collaborate on real-world projects (Vrasidas & Glass, 2004). This approach to learning embraces the participation metaphor (Boud & Hager, 2012) where learning is seen as situated, embedded and maintained in the daily culture of (shared) practices and professional standards (Lave & Wenger; 1991). These practices not only concern the practice of your own classroom or work setting. Participation also means involving yourself with a larger perhaps even a global landscape of connected networks of practice (Teigland, 2003). This process of participation is best served through the ability of people to create and continually extend or maintain a meaningful social/professional network.

Learning analytics solutions, such as NAT assist learners in making their connected world more visible, but will also assist strategic networked learning by providing insight in what possible networks to join. This tool emphasizes the relational approach to learning through which we can gain further insight about who learns from whom,
what they learn from each other, what kind of interaction happens between people who learn together, how frequently learning interactions happen over time. In our research on social professional development networks among teachers in and between schools, we find that working with these visualizations stimulates a networking attitude amongst teachers in the school towards learning. They become aware that they are not alone in their classroom and that professional development is also a social activity; one that is spontaneous and deeply connected to day-to-day challenges in the workplace. Another advantage of these visualizations is that they serve as very concrete artifacts for the teachers to help them reflect on how they act as networkers building a social space for informal learning.

References


